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Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

City of Rockwall

Prepared by: Jacobs Engineering Group Inc.



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1. EXECUTIVE SUMMARY

A Preliminary Energy Assessment (PEA) site visit for the City of Rockwall was conducted during the month of June 2010 for the purpose of identifying viable Energy Conservation Measures (ECMs). This report documents that investigation.

This service is provided by Jacobs at no cost to the City of Rockwall by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and local political subdivisions for the purpose of planning, funding, and implementing cost-effective, energy conservation measures allowing for the reduction in energy consumption of existing facilities ultimately reducing facility energy bills and regional emissions.

The following ECMs were investigated and recommended for implementation or further detailed analysis:

ECM 1: Fire Station Lighting Retrofit: T12 to T8

ECM 2: Fire Station Programmable Thermostat

ECM 3: Service Center Lighting Retrofit: T12 to T8

ECM 4: Service Center Lighting Retrofit: Metal Halide to High Bay T5

ECM 5: Service Center Condenser Replacement

ECM 6: The Center Lighting Retrofit: T12 to T8

ECM 7: The Center Lighting Retrofit: Incandescent to CFL

ECM 8: The Center Condenser Replacement

A preliminary energy and cost savings evaluation was conducted on each recommended measure listed above. Descriptions of these measures and a summary of each evaluation are presented in the following sections. An overall summary of the results is presented in Table 1. Each proposed utility evaluation was based on the prevalent utility costs at the time of the audit.

As seen in Tables 5 through 7, the recommended measures provide for a combined estimated annual savings of \$2,994.66, with an estimated capital requirement of \$27,217.00 thus yielding a composite simple payback period of 9.1 years. Overall, it is estimated that by implementing these measures electric utility consumption in the buildings surveyed can be reduced by 2.9%.

Descriptions and calculations for the recommended measures can be found within this report. A follow-up visit can be scheduled to address questions regarding the report, project financing options, implementation schedules, or any other aspect of this program or its implementation.

SECO is committed to providing whatever assistance is required in planning, funding, and implementing the recommendations of this report. The City of Rockwall is encouraged to direct any questions or concerns to either of the following:

SECO
Stephen Ross
1-800-531-5441, ext 3-1896

Jacobs
Travis Alexander
817-735-7063

Included in the appendix of this report is also a list of websites that can be utilized in learning more about SECO, Senate Bill 12, various funding solutions, energy saving projects, and various state and federal agency services and programs.

2. FACILITY DESCRIPTIONS

Five buildings within the City of Rockwall were audited.

2.1. City Hall

The City Hall is a three story, 21,000 square feet building that was constructed in 2002. The building's exterior walls are stone and brick; windows are double paned; and the roof is metal standing seam.

The lighting fixtures in the building utilize 4 lamp, 32W, T8 fluorescent lights with electronic ballasts. There are also quite a few compact fluorescent lights (CFLs).

The building is cooled by 15 DX split systems and a unitary unit in the server room. The air handlers were manufactured in 2001. The condensing units are from 2001 and 2002. The building is heated with electric resistance heat. Programmable thermostats control each system and temperature schedules are reprogrammed every 6 months.

2.2. Fire Station 1

Fire Station 1 is a two story building of approximately 8,600 square feet that was built in 1984 and remodeled in 2003. It is primarily a metal structure, but the office portion is aggregate and concrete.

The lighting fixtures in the building utilize T12 fluorescent lamps with magnetic ballasts in the bay area and all the offices.

Air conditioning is provided by a two DX split systems. One condensing unit is from 2000 and the other is 2010. Eight electric space heaters heat the bay. The air conditions are controlled by a non-programmable thermostat.

2.3. Police Station

The Police Station is a 10,000 square foot, concrete building that was built in the 1970s and renovated mid 1990s. The roof is a flat, white membrane surface. Windows are tinted double pane.

32W, T8 lamps with 4 lamp fixtures and electronic ballast are primarily used in the building.

Two DX split systems and a 38-ton unitary system provide air conditioning to the Police Station. For the split systems, the condensing units were manufactured in 2005 and 2009. Both air handling units are from 2001. The unitary system is a 2002, rooftop unit. There is another air handler in the server room. The building is EMS controlled, but not by the city. There are two programmable thermostats in the building.

2.4. The Center

The Center is a brick, one story building that is Rockwall's original City Hall. In 2002 expansions were made and City Hall was moved to a new building. The old section has a shingled roof while the new portion is standing metal seam. All together the Center is 13,000 square feet.

There are various types of lighting in the Center. In the old part, there are 4 lamp T12 fluorescents (magnetic ballast), CFLs, and a few incandescent lamps. The new building is a mixture of incandescent lamps and 4 lamp T12s.

There are eight DX split systems that provide air conditioning to the Center. There is 2008 condensing unit, one manufactured in 1997, one in 1998, and the rest in 2001. Several units are very dirty and have torn and dented mesh and coils. An A/C repair man stated that the large 2001 unit is already approaching the end of its useful life. There is also a window unit in an office. There is one gas heater in the building. Programmable thermostats control the temperature in the buildings. Non-programmable thermostats are used to control the electric heaters.

2.5. Service Center

The Service Center, built in 1984, is a concrete building with an attached shop made of metal siding and with a metal standing seam roof. There are several other storage buildings nearby constructed of the same materials as the shop. In all, the buildings are 8,400 square feet. The windows in the office are single paned, tinted, and stretch from floor to ceiling.

Lighting is made up of 4 lamp T12 fluorescent lamps (magnetic ballasts) in the climate controlled rooms. The work areas are metal halide lights.

There are two DX split systems that cool the building. One condensing unit was manufactured in 2001 and the other in 2004. Space heaters are used in the shop area. Insulation in the shop area and above the offices is poorly distributed and deteriorating.

3. FACILITY ENERGY PERFORMANCE

Based on current utility data, the City of Rockwall buildings have the following annual electric costs, Energy Use Index (EUI), and Energy Cost Index (ECI):

	Building	Electric			Natural Gas			Total	Total	EUI	ECI	SF
		kWh/Yr	MMBTU/Yr	\$Cost/Yr	MCF/Yr	MMBTU/Yr	\$Cost/Yr	\$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	\$/SF/Yr	
1	Fire Station	111,183	379	\$7,959.40	0	0	\$0.00	\$7,959.40	379	44	\$0.93	8,600
2	Police Building	605,887	2067	\$43,240.15	0	0	\$0.00	\$43,240.15	2,067	130	\$2.72	15,900
3	The Center	255,205	871	\$18,301.30	85	98	\$940.39	\$19,241.69	969	75	\$1.48	13,000
4	Service Center	107,290	366	\$7,669.77	6679	7708	\$9,840.94	\$17,510.71	8,074	961	\$2.08	8,400
5	City Hall	374,672	1278	\$26,141.52	0	0	\$0.00	\$26,141.52	1,278	61	\$1.24	21,000
		kWh/Yr	MMBTU/Yr	\$Cost/Yr	MCF/Yr	MMBTU/Yr	\$Cost/Yr	\$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	\$/SF/Yr	SF
		1,454,237	4,962	\$103,312.14	6763.9	7806	\$10,781.33	\$114,093.47	12,767	254	\$1.69	66,900

Table 1: Benchmarked Energy Usage

The utility data collected can be found in Appendix A.

The EUI, an estimate of the energy consumption performance, is measured in thousands of BTUs per square foot per year. Likewise, the ECI, an estimate of the energy cost performance, is measured in dollars per square foot per year.

Both energy consumption and costs in the Police Building are high. Since the air conditioning system units are within the acceptable life range and efficiency, this concentration of energy usage can be attributed to the many computer and electronic tasks being performed within the building and the 24 hour use.

4. ENERGY ACCOUNTING

ENERGY ACCOUNTING DESCRIPTION

Energy data was gathered using monthly bills. All buildings use the same electricity provider. Both buildings that use gas get it from the same provider.

AVERAGE UTILITY RATES

Utility Name	Average Rates
Direct Energy	\$0.0712 / kWh
Atmos Gas	\$1.57 / MCF

Table 2: Utility Rates

5. RECOMMENDATIONS

MAINTENANCE AND OPERATIONS (M&O)

Maintenance and operations measures that often involve recommended changes in occupant behavior and maintenance practices that effect energy consumption.

Police Station

Management & Operations (M&Os)
Project Description
ENERGY STAR PC Power Management
Clean condenser coils

Table 3: M&O Recommendations at Police Station

City Hall

Management & Operations (M&Os)
Project Description
ENERGY STAR PC Power Management
Replace fan motor
Incorporate lighting strategy

Table 4: M&O Recommendations at City Hall

PC power management can help reduce equipment energy draw and equipment heat gain to the space (which would add to the cooling load). Computers with “sleep mode” that run on low power when not in use or the purchase of lower energy using Energy Star computers can have an effect. Computers should especially be switched off at night when not used to further conserve energy. It is possible to purchase timed power disconnects to ensure equipment is shutoff at night but these are usually not recommended for facilities this size, especially since the building occupants manage the building fairly well already on these types of measures. Switching off faxes and copiers at night will also help but most of the newer models shutoff automatically after long periods of no use.

Air coils in DX units can become clogged as debris from plant life and dirt that gets picked up by the units. This clogging of the coil adds strain to the unit's compressor and causes the unit to have increased energy costs. Cleaning these coils with a power washer can increase the unit efficiency by 5%-15% while also extending their lives. Therefore, it is suggested that units with dirty coils be cleaned so that the units are able to run at peak efficiency. Also consider cleaning the evaporator coil and verifying that there is a proper refrigerant charge.

The main recommended lighting strategy would be to install occupancy sensors to automatically shut off lights during unoccupied periods. Lights can still be equipped with manual overrides to ensure the lights turning on don't cause a nuisance if one is doing a presentation with a projector for instance. According to the building occupants though, everyone is pretty good about switching off lights during unoccupied periods so this control method may just be an added complication that does not save much energy over the status quo.

ENERGY CONSERVATION MEASURES (ECMs)

Description of ECMs; Estimated Implementation Cost (\$); Estimated Annual Energy Cost Savings (\$/yr)

Fire Station

Energy Conservation Measures (ECMs)					
ECM	Project Description	Estimated Implementation Cost	Estimated Annual Savings (kWh/yr)	Estimated Annual Cost Savings	Simple Payback (years)
ECM 1	Replace T12 fluorescent lights with T8	\$5,881.48	12,896	\$918.17	6.4
ECM 2	Install new programmable thermostat	\$212.44	4,719	\$336.54	0.6

Table 5: Fire Station ECMs

Service Center

Energy Conservation Measures (ECMs)					
ECM	Project Description	Estimated Implementation Cost	Estimated Annual Savings (kWh/yr)	Estimated Annual Cost Savings	Simple Payback (years)
ECM 3	Replace T12 fluorescent lights with T8	\$6,109.39	5,825	\$414.71	14.7
ECM 4	Replace metal halide lamps with high bay, fluorescent T5 lamps	\$2,361.35	8,488	\$604.38	3.9
ECM 5	Replace single condenser unit	\$3,437.55	1,351	\$96.18	35.7

Table 6: Service Center ECMs

The Center

Energy Conservation Measures (ECMs)					
ECM	Project Description	Estimated Implementation Cost	Estimated Annual Savings (kWh/yr)	Estimated Annual Cost Savings	Simple Payback (years)
ECM 6	Replace T12 fluorescent lights with T8	\$3,701.64	5,613	\$399.62	9.3
ECM 7	Replace incandescent lamps with CFLs	\$62.10	246	\$17.49	3.6
ECM 8	Replace Condenser	\$5,451.06	2,923	\$208.08	26.2

Table 7: The Center ECMs

ECM 1, ECM 3, ECM 4, ECM 6, and ECM 7 involve reducing the energy spent by lighting the buildings. Retrofitting lights by replacing existing T12 fluorescent light fixtures with new T8 fixtures reduces energy usage through lighting and cooling. Changing from magnetic to electric ballast increases the energy efficiency and therefore lowers cost. The new bulbs themselves also use less wattage. The same is true of the metal halide to high bay fluorescent T5s and incandescent to CFLs.

Two new programmable thermostats could be installed at the Fire Station (ECM 2). Each thermostat will be programmed to maintain a fixed temperature during the occupied periods each day. In the evening, the temperature will be maintained higher or lower than during hours of occupancy (depending on whether it is the cooling or heating season, respectively). This will conserve energy and increase the lifespan of the equipment.

ECM 5 and ECM 8 involve replacing condensing units with new, more efficient equipment (SEER 14 or higher for equipment up to 5 tons. EER of 11 or higher for equipment larger than 5 tons). The existing unit at The Center is only 9 years old, but has been not working properly and a repair man has notified the facility manager that it is likely to fail. Replacing the unit will result in more reliable and effective cooling, reduced electric energy consumption, and lower utility bills.

FACILITY IMPROVEMENT MEASURES (FIMs)

Service Center

Facility Improvement Measures (FIMs)
Project Description
Install insulation in shop area between shop and offices
Replace single pane windows with double pane

Table 8: FIMs at the Service Center



Figure 1 - Insulation in the Service Center

The insulation of offices in the shop area was installed poorly. The existing layer of lay-in batt is unevenly distributed. Reinstallation or replacement would assist in maintaining effective cooling in the office areas.

The Service Center currently has single-pane, tinted, floor length windows. These windows have poor insulating properties and contribute to solar heat gain which increases the cooling load. A recommended FIM is to replace the existing windows with new double-pane windows with low-emissivity (low-e) coating. Double-pane glass will increase the resistance to heat loss/gain and the low-e coating will help block infrared radiation from the sun which adds heat to the space. Typically, window film is the most cost effective solution, but in the case of the Service Center is not enough.

RECOMMENDATIONS SUMMARY

Energy Conservation Measures (ECMs)					
ECM	Location	Project Description	Estimated Implementation Cost	Estimated Annual Savings (kWh/yr)	Simple Payback (years)
ECM 1	Fire Station	Lighting Retrofit: T12 to T8	\$5,881.48	12,896	6.4
ECM 2	Fire Station	Install new programmable thermostat	\$212.44	4,719	0.6
ECM 3	Service Center	Lighting Retrofit: T12 to T8	\$6,109.39	5,825	14.7
ECM 4	Service Center	Lighting Retrofit: Metal Halide to T5	\$2,361.35	8,488	3.9
ECM 5	Service Center	Replace condenser	\$3,437.55	1,351	35.7
ECM 6	The Center	Lighting Retrofit: T12 to T8	\$3,701.64	5,613	9.3
ECM 7	The Center	Lighting Retrofit: Incandescent to CFL	\$62.10	246	3.6
ECM 8	The Center	Replace condenser	\$5,451.06	2,923	26.2

Table 9: ECM Summary

Management & Operations (M&Os)
Project Description
ENERGY STAR PC Power Management
Replace fan motor at City Hall
Clean condenser coils at Police Station

Table 10: M&O Summary

Facility Improvement Measures (FIMs)
Project Description
Install insulation in shop area between shop and offices
Replace single pane windows with double pane

Table 11: FIM Summary

6. EMISSION CALCULATIONS

	Annual kWh Reduction	Pollution Prevention Factors			Equivalent to:		
		CO ₂	NO _x	SO ₂	Annual Number of Cars Taken Off the Road	Annual Number of Acres of Trees Planted	Annual Number of American Homes of Electricity Needs
		Carbon Dioxide (Pounds)	Nitrogen Oxide (Grams)	Sulphur Dioxide (Grams)	lbs CO ₂ / 10,000	lbs CO ₂ / 7,300	kWh / 10,000
Fire Station	12,896	15,295	17,796	28,629	2	2	1
Service Center	13,311	15,787	18,369	29,550	2	2	1
The Center	5,574	6,611	7,692	12,374	1	1	1
Total	31,781	37,692	43,858	70,554	4	5	3

Table 12: Emission Calculations

With the energy savings shown above, the resulting reduced amount of pollution has been calculated. Making the proposed improvements is equivalent to 4 cars being taken off the road, planting 5 acres of trees, and powering 3 American homes.

APPENDIX A: UTILITY ANALYSIS DATA

Electric Data

Fire Station

Date	Usage (kWh)	Cost
Apr-09	9,054	\$ 631.43
May-09	8,118	\$ 566.15
Jun-09	9,936	\$ 692.94
Jul-09	12,276	\$ 856.13
Aug-09	11,214	\$ 782.06
Sep-09	12,240	\$ 853.62
Oct-09	9,018	\$ 628.92
Nov-09	8,658	\$ 603.81
Dec-09	8,064	\$ 562.38
Jan-10	9,168	\$ 663.27
Feb-10	8,220	\$ 633.60
Mar-10	70,246	\$ 558.00
Total	167,158	\$ 7,400.88

The Center

Date	Usage (kWh)	Cost
Apr-09	19,035	\$1,327.50
May-09	14,835	\$1,034.59
Jun-09	18,330	\$1,278.33
Jul-09	29,280	\$2,041.99
Aug-09	28,110	\$1,960.39
Sep-09	25,545	\$1,781.51
Oct-09	15,960	\$1,113.05
Nov-09	13,290	\$926.84
Dec-09	19,155	\$1,335.87
Jan-10	34,200	\$2,473.71
Feb-10	22,500	\$1,734.30
Mar-10	170,000	\$1,310.36
Total	391,205	\$16,990.94

Police and Court Buildings (Bldg and Parking Lights)

Date	Usage (kWh)	Cost
Jul-09	60,219	\$ 4,199.67
Aug-09	54,107	\$ 3,773.43
Sep-09	55,403	\$ 3,863.81
Oct-09	43,904	\$ 3,061.87
Nov-09	39,588	\$ 2,760.87
Dec-09	49,617	\$ 3,460.29
Jan-10	75,850	\$ 5,486.27
Feb-10	53,328	\$ 4,110.53
Mar-10	120	\$ 9.25
Apr-10	43,146	\$ 3,325.69
May-10	620,990	\$ 44,610.88
Jun-10	47,522	\$ 3,663.00
Total	1,143,794	\$ 82,325.56

Service Center

Date	Usage (kWh)	Cost
Jul-09	12,821	\$894.13
Aug-09	11,186	\$780.11
Sep-09	10,657	\$743.22
Oct-09	8,162	\$569.22
Nov-09	7,260	\$506.31
Dec-09	8,315	\$579.89
Jan-10	9,813	\$709.78
Feb-10	6,905	\$532.24
Mar-10	8,506	\$655.64
Apr-10	6,653	\$512.82
May-10	107,290	\$7,669.77
Jun-10	9,085	\$700.27
Total	206,653	\$14,853.40

City Hall

Date	Usage (kWh)	Cost
Apr-09	32,808	\$2,288.03
May-09	22,536	\$1,571.66
Jun-09	29,160	\$2,033.62
Jul-09	36,840	\$2,569.22
Aug-09	32,712	\$2,281.33
Sep-09	33,144	\$2,311.46
Oct-09	24,072	\$1,678.78
Nov-09	20,800	\$1,450.59
Dec-09	31,840	\$2,220.52
Jan-10	57,920	\$4,189.39
Feb-10	37,120	\$2,861.21
Mar-10	240,480	\$1,086.82
Total	566,624	\$24,254.60

Gas Data

The Center

Date	Usage (CFM)	Cost
Oct-08	1,600	\$ 40.50
Nov-08	5,200	\$ 75.36
Dec-08	27,500	\$ 324.45
Jan-09	23,000	\$ 209.07
Feb-09	10,700	\$ 89.34
Mar-09	9,800	\$ 69.32
Apr-09	3,800	\$ 33.54
May-09	400	\$ 17.44
Jun-09	400	\$ 17.40
Jul-09	500	\$ 18.43
Aug-09	500	\$ 19.17
Sep-09	1,500	\$ 26.37
Totals	84,900	\$ 940.39

Service Center

Date	Usage (CFM)	Cost
Oct-08	20,000	\$ 40.57
Nov-08	484,000	\$ 720.86
Dec-08	2,012,000	\$ 2,855.54
Jan-09	1,982,000	\$ 3,064.39
Feb-09	616,000	\$ 899.51
Mar-09	985,000	\$ 1,407.77
Apr-09	16,000	\$ 27.68
May-09	0	\$ -
Jun-09	0	\$ -
Jul-09	0	\$ -
Aug-09	564,000	\$ 824.62
Sep-09	0	\$ -
	6,679,000	\$ 9,840.94

APPENDIX B: ECM INFORMATION

ECM 1: Lighting Retrofit T12 to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Rockwall			PROJECT NO.: FEWE0701-ROCKWALL			
PROJECT LOCATION:	Fire Station			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Replace T12 with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 4 lamps/fixture	29	EA	\$41.75	\$1,210.75	\$32.00	\$928.00	\$2,138.75
Replace T12 fluorescents with T8s 96" length - 2 lamps/fixture	40	EA	\$44.50	\$1,780	\$28.00	\$1,120	\$2,900.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$2,990.75		\$2,048.00	\$5,038.75
CONTINGENCIES		15.0%					\$755.81
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$86.92
TOTAL							\$5,881.48

Energy 48" lamps

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
T-12 Fluorescents (148W/fixture)	29	EA	12	365	18,799
T-8 Fluorescents (120W/fixture)	29	EA	12	365	15,242
Estimated Annual Savings					3,557

Energy 96" lamps

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
T-12 Fluorescents (142W/fixture)	40	EA	24	365	49,757
T-8 Fluorescents (116W/fixture)	40	EA	24	365	40,646
Estimated Annual Savings					9,110

Total Lighting Costs Calculations

Facility Name: <u>Fire Station</u>	City: <u>Rockwall</u>
Site Address: <u>305 E. Boydston Ave.</u>	County: <u>Rockwall</u>
ECM Number: <u>1</u>	Building Area: <u>8,600</u> SF
ECM Description: <u>T12 - T8 lighting retrofit</u>	Predominate Use: _____

Existing T12 lighting in Fire Station could be upgraded to T8 lighting

	4'	8'	Elec Rate= 0.0712
Existing Conditions:	3,800	4,800	SF of area observed
	29	40	Number of florescent fixtures in area observed
	148	142	Wattage of fixtures observed in area
	120	116	Wattage of fixtures after retrofit
	4,380	8,760	Annual lighting hours
	0.812	1.040	kW savings due to lighting consumption
12667	3557	9110	Annual kWh savings due to lighting consumption
	1.44		Assumed kW/ton of cooling
	0.23		Peak tons of cooling saved from lighting retrofit
	0.33		kW savings due to cooling load reduction
	229		Annual kWh savings due to cooling load reduction
	2.18		Total Annual kW savings
	12,896		Total Annual kWh savings
	\$918		Total Cost Savings
	\$5,881		Estimated Cost
	6.4		Simple Payback

ECM 2: Installation of Programmable Thermostats

Cost Estimation

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Rockwall			PROJECT NO.: FEWE0701-ROCKW			
PROJECT LOCATION:	Fire Station			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Install Programmable Thermostats			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Programmable Thermostat	1	EA	\$49.00	\$ 49	\$133.00	\$ 133	\$182.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$49.00		\$133.00	\$182.00
CONTINGENCIES		15.0%					\$27.30
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$3.14
TOTAL							\$212.44

Energy Savings Calculations

Facility Name: Fire Station	City: Rockwall
Site Address: 305 E. Boydston Ave.	County: Rockwall
ECM Number: 2	Building Area: 8600 SF
ECM Description: Programmable Thermostats	Predominate Use: Office

Opportunity: When the space is unoccupied, setpoint temperature can change to reduce heating/cooling load

Assumed U-Values Walls	0.124 Btu/hr-ft ² -F	Electric Rate: 0.07131
Assumed Wall Area	2,466 ft ²	
Assumed U-Values Roof	0.064 Btu/hr-ft ² -F	
Assumed Roof Area	3,800 ft ²	
Heating Season Thermostat Setpoint	70 F	
Heating Season Thermostat Setback	60 F	
Heating Season Setback Hours	1,456 hrs	
Heating Equipment Efficiency	100%	
Cooling Season Thermostat Setpoint	72 F	
Cooling Season Thermostat Setback	85 F	
Cooling Season Setback Hours	3,276 hrs	
Performance of Cooling System	1.22 kW/ton	
Total Envelope UA - Value	549 Btu/hr-F	
Electric Heating Energy Savings	2,343 kWh/yr	
Electric Heating Cost Reduction	167 \$/yr	
Cooling Energy Savings	2,377 kWh/yr	
Estimated Electricity Rate	\$0.071 per kWh	
Cooling Cost Savings	169 \$/yr	
Annual Cost Savings	\$337	
Installed cost	\$212	
Simple Payback	0.6 years	

ECM 3: Lighting Retrofit T12 to T8

Cost Estimate

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Rockwall			PROJECT NO.: FEWE0701-ROCKWALL			
PROJECT LOCATION:	Service Center			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Replace T12 with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 4 lamps/fixture	36	EA	\$41.75	\$1,503.00	\$78.50	\$2,826.00	\$4,329.00
Replace T12 fluorescents with T8s 96" length - 2 lamps/fixture	10	EA	\$44.50	\$ 445	\$28.00	\$ 280	\$725.00
Replace T12 fluorescents with T8s 4" length - 2 lamps/fixture	3	EA	\$37.00	\$ 111	\$23.00	\$ 69	\$180.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$2,059.00		\$3,175.00	\$5,234.00
CONTINGENCIES		15.0%					\$785.10
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$90.29
TOTAL							\$6,109.39

Energy 48", 4 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
T-12 Fluorescents (148W/fixture)	36	EA	10	365	19,447
T-8 Fluorescents (120W/fixture)	36	EA	10	365	15,768
Estimated Annual Savings					3,679

Energy 96", 2 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
T-12 Fluorescents (142W/fixture)	10	EA	18	365	9,329
T-8 Fluorescents (116W/fixture)	10	EA	18	365	7,621
Estimated Annual Savings					1,708

Energy 48", 2 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
T-12 Fluorescents (74W/fixture)	3	EA	10	365	810
T-8 Fluorescents (60W/fixture)	3	EA	10	365	657
Estimated Annual Savings					153

Total Energy Savings Calculations

Facility Name: Service Center
 Site Address: 1600 Airport Road
 ECM Number: 3
 ECM Description: T12 - T8 lighting retrofit

City: Rockwall
 County: Rockwall
 Building Area: 8,400 SF
 Predominate Use: _____

Existing T12 lighting in Service Center could be upgraded to T8 lighting

	4' 4 lamp	4' 2 lamp	8' 2 lamp	
Existing Conditions:	36	3	10	Number of florescent fixtures in area observed
	148	74	142	Wattage of fixtures observed in area
	120	60	116	Wattage of fixtures after retrofit
	3,650	3,650	6,570	Annual lighting hours
	1.008	0.042	0.260	kW savings due to lighting consumption
	3679	153	1708	Annual kWh savings due to lighting consumption
	1.44			Assumed kW/ton of cooling
	0.29			Peak tons of cooling saved from lighting retrofit
	0.41			kW savings due to cooling load reduction
	284			Annual kWh savings due to cooling load reduction
		1.72		Total Annual kW savings
		5,825		Total Annual kWh savings
		\$415		Total Cost Savings
		\$6,109		Estimated Cost
		14.7		Simple Payback

ECM 4: Lighting Retrofit Metal Halide to T5

Cost Estimate

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Rockwall			PROJECT NO.: FEWE0701-ROCKWALL			
PROJECT LOCATION:	Service Center			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Replace metal halides with T8s			CHECKED BY:			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace metal halide with high bay fluorescent T5s	17	EA	\$44.00	\$748.00	\$75.00	\$1,275.00	\$2,023.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$748.00		\$1,275.00	\$2,023.00
CONTINGENCIES		15.0%					\$303.45
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$34.90
TOTAL							\$2,361.35

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Metal halide (300W/fixture)	17	EA	18	365	33,507
T5 Fluorescents (224W/fixture)	17	EA	18	365	25,019
Estimated Annual Savings					8,488

Total Energy Savings Calculations

Facility Name: <u>Service Center</u>	City: <u>Rockwall</u>
Site Address: <u>1600 Airport Road</u>	County: <u>Rockwall</u>
ECM Number: <u>4</u>	Building Area: <u>8,400</u> SF
ECM Description: <u>Metal halide - T8 lighting retrofit</u>	Predominate Use: _____

Existing metal halide lighting in Service Center could be upgraded to T8 lighting
Elec Rate= 0.0712

Existing Conditions: 17 Number of metal halide fixtures in area observed
300 Wattage of fixtures observed in area
224 Wattage of fixtures after retrofit

6,570 Annual lighting hours
1.292 kW savings due to lighting consumption
8,488 Annual kWh savings due to lighting consumption

Assumed kW/ton of cooling
Peak tons of cooling saved from lighting retrofit
kW savings due to cooling load reduction
Annual kWh savings due to cooling load reduction

1.29 Total Annual kW savings
8,488 Total Annual kWh savings
\$604 Total Cost Savings

\$2,361 Estimated Cost

3.9 Simple Payback

ECM 5: Condenser Unit replacement

UNIT REPLACEMENT COST

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	City of Rockwall			PROJECT NO.: FEWE0701-ROCKW			
PROJECT LOCATION:	Rockwall, TX			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Condenser Replacement			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace Condensing Unit	1	EA	\$ 1,120	\$ 1,120	\$ 1,825	\$ 1,825	\$ 2,945
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$ -	\$ -
SUBTOTAL				\$ 1,120		\$ 1,825	\$ 2,945
CONTINGENCIES		15.0%					\$ 442
DESIGN		0.0%					\$ -
CONSTRUCTION ADMINISTRATION		1.5%					\$ 51
TOTAL							\$ 3,438

ENERGY AND COST SAVINGS CALCULATIONS

Facility Name: <u>The Center</u>	City: <u>Rockwall</u>
Site Address: <u>108 E. Washington</u>	County: <u>Rockwall</u>
ECM Number: <u>5</u>	Building Area: <u>13,000</u>
ECM Description: <u>Replace Condensing Unit</u>	Predominate Use: <u>Air Cooling</u>

Sheet 1 of 1

Opportunity: Replace condensing unit with a higher efficiency unit

Elec. Rate= 0.0712

	1	Number of units
	5	Tons per unit
	10.0	Estimated existing EER
	1.20	Estimated existing kW/ton
	14.0	New equipment EER
	0.86	New equipment kW/ton
	788	Estimated equivalent full load hours
Estimated peak kW Savings:	1.7	kW
Total Estimated kWh Savings:	1,351	kWh per year
Cost Savings:	\$96	per year
Estimated Cost:	\$3,438	
Simple Payback:	35.7	years

ECM 6: Lighting Retrofit T12 to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Rockwall			PROJECT NO.: FEWED701-ROCKWALL			
PROJECT LOCATION:	The Center			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Replace T12s with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 4 lamps/fixture	43	EA	\$41.75	\$1,795.25	\$32.00	\$1,376.00	\$3,171.25
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$1,795.25		\$1,376.00	\$3,171.25
CONTINGENCIES		15.0%					\$475.69
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$54.70
TOTAL							\$3,701.64

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	
T-12 Fluorescents (148W/fixture)	43	EA	12	365	27,874
T-8 Fluorescents (120W/fixture)	43	EA	12	365	22,601
Estimated Annual Savings					5,274

Total Energy Savings Calculations

Facility Name: The Center	City: Rockwall
Site Address: 108 E. Washington	County: Rockwall
ECM Number: 6	Building Area: 13,000 SF
ECM Description: T12 - T8 lighting retrofit	Predominate Use: Gathering / Recreation

Existing T12 lighting in Fire Station could be upgraded to T8 lighting

Elec Rate= 0.0712

Existing Conditions:	13,000	SF of area observed
	43	Number of florescent fixtures in area observed
	148	Wattage of fixtures observed in area
	120	Wattage of fixtures after retrofit
	4,380	Annual lighting hours
	1.204	kW savings due to lighting consumption
	5274	Annual kWh savings due to lighting consumption
	1.44	Assumed kW/ton of cooling
	0.34	Peak tons of cooling saved from lighting retrofit
	0.49	kW savings due to cooling load reduction
	339	Annual kWh savings due to cooling load reduction
	1.70	Total Annual kW savings
	5,613	Total Annual kWh savings
	\$400	Total Cost Savings
	\$3,702	Estimated Cost
	9.3	Simple Payback

ECM 7: Lighting Retrofit Incandescent to CFL

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Rockwall			PROJECT NO.: FEWE0701-ROCKWALL			
PROJECT LOCATION:	The Center			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Replace Incandescents with CFLs			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace Incandescent Lights with CFLs	3	EA	\$10.00	\$30.00	\$8.00	\$24.00	\$54.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$30.00		\$24.00	\$54.00
CONTINGENCIES		15.0%					\$8.10
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		0.0%					\$0.00
TOTAL							\$62.10

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Incandescent Lights (60W apiece)	3	EA	4	365	263
CFL Lights (13W apiece)	3	EA	4	365	57
Estimated Annual Savings					206

Total Energy Savings Calculations

Facility Name: <u>The Center</u>	City: <u>Rockwall</u>
Site Address: <u>108 E. Washington</u>	County: <u>Rockwall</u>
ECM Number: <u>7</u>	Building Area: <u>13,000</u> SF
ECM Description: <u>Incandescent to CFL lighting retrofit</u>	Predominate Use: <u>Gathering / Recreation</u>

Existing incandescent lighting in The Center could be upgraded to CFL.

Elec Rate= 0.0712

Existing Conditions:	13,000	SF of area observed
	3	Number of florescent fixtures in area observed
	60	Wattage of fixtures observed in area
	13	Wattage of fixtures after retrofit
	1,460	Annual lighting hours
	0.141	kW savings due to lighting consumption
	206	Annual kWh savings due to lighting consumption
	1.44	Assumed kW/ton of cooling
	0.04	Peak tons of cooling saved from lighting retrofit
	0.06	kW savings due to cooling load reduction
	40	Annual kWh savings due to cooling load reduction
	0.20	Total Annual kW savings
	246	Total Annual kWh savings
	\$17	Total Cost Savings
	\$62	Estimated Cost
	3.6	Simple Payback

ECM 8: Condenser Unit Replacement

UNIT COST

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	City of Rockwall			PROJECT NO.: FEWE0701-ROCKW			
PROJECT LOCATION:	The Center			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Condenser Replacement			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace Condensing Unit	1	EA	\$ 1,320	\$ 1,320	\$ 3,350	\$ 3,350	\$ 4,670
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$ -	\$ -
SUBTOTAL				\$ 1,320		\$ 3,350	\$ 4,670
CONTINGENCIES		15.0%					\$ 701
DESIGN		0.0%					\$ -
CONSTRUCTION ADMINISTRATION		1.5%					\$ 81
TOTAL							\$ 5,451

ENERGY AND COST SAVINGS CALCULATIONS

Facility Name:	The Center	City:	Rockwall
Site Address:	108 E. Washington	County:	Rockwall
ECM Number:	8	Building Area:	13,000 SF
ECM Description:	Replace Condensing Unit	Predominate Use:	Air Cooling

Sheet 1 of 1

Opportunity: Replace condensing unit with a higher efficiency unit

Elec. Rate= 0.0712

	1	Number of units
	12.5	Tons per unit
	10.4	Estimated existing EER
	1.15	Estimated existing kW/ton
	14.0	New equipment EER
	0.86	New equipment kW/ton
	788	Estimated equivalent full load hours
Estimated peak kW Savings:	3.7	kW
Total Estimated kWh Savings:	2,923	kWh per year
Cost Savings:	\$208	per year
Estimated Cost:	\$5,451	
Simple Payback:	26.2	years

APPENDIX C: ENERGY STAR - PORTFOLIO MANAGER

Energy Star is a joint program between the US Environmental Protection Agency (US EPA) and the Department of Energy (US DOE) that promotes the efficient use of energy in multiple industries. One focus of the Energy Star program is on energy efficiency of existing buildings.

Portfolio Manager was created as an industry tool to aid those that work with existing buildings in benchmarking energy performance. Portfolio Manager benchmarking data is based on the Commercial Buildings Energy Consumption Survey administered by the US DOE Energy Information Administration every four years. The survey includes energy use figures from thousands of buildings throughout the United States for various end uses. For a particular building type (e.g. and office building), the building is compared statistically to similar buildings in the survey and assigned a score of 1-100. A score of 50 indicates an average building in terms of energy performance. A score of 1 means that the building is in the lowest 1% of buildings for energy performance and a score of 100, indicates performance in the top 1%.

Energy Star - Portfolio Manager			
Building	Site EUI (kbtu/sf/yr)	Source EUI (kbtu/sf/yr)	Energy Star Rating (1-100)
City Hall	64.0	213.7	32
Fire Station	44.1	147.3	N/A
Police Station	206.9	690.9	N/A
Service Center	112.6	206.4	N/A
The Center	77.0	241.1	10

Site Energy Use Intensity (EUI) uses figures of metered electrical kWh to the building and metered natural gas figures in cubic feet and then converts them to kbtus. This is the same procedure used for EUI earlier in this report. Portfolio Manager also calculates source EUI for easier comparison among fuel types. Source EUI takes into account energy losses from the original fuel source. For electricity, the original fuel consumption occurs at the power plant where electrical conversion efficiencies are often 30-40% for traditional fossil fuel sources. Portfolio Manager uses a source-site factor (or ratio) to convert site energy to source energy and it uses the same figure for all grid-supplied electricity. The source-site factor for electricity is 3.340. So for the City Hall building, one would take the site EUI of 64.0 kbtu/sf/yr and multiply it by 3.340, this comes to a source EUI of 213.7 kbtu/sf/yr.

Due to a lack of data to compare them to, Police Stations, Fire Stations, and workshop areas are not included in the rating system. The constant use and high equipment and process loads greatly affect the EUI. The Center also has a different operating mode than the typical office building, which throws off the Rating.

APPENDIX D: FUNDING AND PROCUREMENT

NON-TRADITIONAL FUNDING METHODS

When traditional means of funding projects are not available, non-traditional funding may be desirable in order to implement beneficial projects. Energy and operational cost savings can be used to fund projects such as the ones recommended in this report. A couple of options are available when considering funding projects with cost savings.

The first way would be to secure a low interest loan and fund the projects internally by “fixing” the operational budgets over the term of the loan and use the savings to pay back the loan. Low interest loans are available through the State's Texas LoanSTAR (Saving Taxes and Resources) Program.

The LoanSTAR Program has served as a national model for state and federal loan programs for energy efficiency retrofits, and is SECO's most highly visible program. Legislatively mandated to be funded at a minimum of \$95 million at all times, to date the LoanSTAR Program has saved Texas taxpayers over \$250 million through energy efficiency projects, financed for state agencies, institutions of higher education, school districts, and local governments. The program's revolving loan mechanism allows borrowers to repay loans through the stream-of-cost savings generated by the funded projects. The program will fund energy saving projects with a maximum combined simple payback of 10 years.

The interest rate for the LoanSTAR Program is based on several factors which include money market rates and LoanSTAR administrative cost. Rates are evaluated and set every fiscal year, from 9/01 - 8/31.

In order to qualify for funding from the LoanSTAR Program, a detailed energy audit or energy assessment report (EAR) must be completed for the facility/department by a licensed professional engineer in the State of Texas. The purpose of the EAR is to validate the savings estimated in this PEA, through a very detailed approach, as well as confirm the scope of work required for each project.

To assure the borrower that projects are constructed according to the EAR and LoanSTAR technical guidelines, SECO performs design specification review and on-site construction monitoring at 50% and 100% complete.

Another non-traditional solution to funding these projects is to secure the services of a performance contractor. Performance contractors can finance projects in the same manner as the LoanSTAR program by using energy and operational savings as funding for the projects. Performance contractors can package projects with paybacks up to 20 years and pull from a large variety of financial resources for low-interest funding (including the LoanSTAR Program). For more information on this subject feel free to visit the SECO website or call Jacobs at the number shown on the front cover of this PEA.

APPENDIX E: GOVERNMENT LEGISLATION AND STANDARDS

Energy Efficiency Programs in Political Subdivisions

Senate Bill 12

An Act relating to programs for the enhancement of air quality, including energy efficiency standards in state purchasing and energy consumption.

House Bill 3693

An Act relating to energy demand, energy load, energy efficiency initiatives, energy programs, and energy performance measures.

HB 3693 and SB 12 Rules

The State Energy Conservation Office (SECO) has published rules on House Bill (HB) 3693 and Senate Bill (SB) 12 for persons who have an interest in the adoption of energy codes to have an opportunity to comment on newly published editions of the International Energy Conservation Code and the International Residential Code. The code manuals can be purchased at the **International Code Council** web site.

BACKGROUND

In 2001, the 77th Texas Legislature passed **Senate Bill 5 (SB5)**, also known as the Texas Emissions Reduction Plan, to amend the Texas Health and Safety Code. The legislation required ambitious, fundamental changes in energy use to help the state comply with federal Clean Air Act standards. It applied to all political subdivisions within 38 designated counties, later expanded to **41 counties**.

In 2007, the 80th Texas Legislature passed **Senate Bill 12 (SB 12)** which among other things extended the timeline set in SB 5 for emission reductions. Where SB 5 required political subdivisions to reduce their electrical consumption by five percent (5%) for five years beginning January 1, 2002, the SB 12 legislation requires that such entities establish a goal to make the five percent (5%) reductions each year for six years, effective September 1, 2007.

SB 12 amended the Health and Safety Code Section 388.005, in part, by requiring affected political subdivisions to: implement all cost-effective energy-efficiency measures, establish a goal to reduce electricity consumption by 5 percent each year for 6 years, and report efforts and progress annually to the State Energy Conservation Office (SECO). The report details the efforts being undertaken by SECO to provide assistance and information to affected entities, as well as the progress and efforts made by political subdivisions in meeting the energy efficiency mandates of SB 5/SB 12.

Meeting Your Energy Efficiency Goals

In terms of energy efficiency, the biggest step is requiring new buildings to meet the state's energy performance standards. These standards call for better weather stripping, more efficient air conditioners, stricter insulation guidelines, switches to turn off water heaters, tighter building envelopes and energy-efficient windows for new buildings. Under the new law, municipalities and counties can continue to make local amendments to the state energy codes as long as they are not less stringent than the statewide standard.

Source: <http://www.seco.cpa.state.tx.us/sb5compliance.htm>

USEFUL WEBSITES:

A. DATABASE OF STATE INCENTIVES FOR RENEWABLE ENERGY

www.dsireusa.org

DSIRE provides information on state, local, utility, and selected federal incentives that promote renewable energy.

B. OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

www.eere.energy.gov

EERE is a resource site containing hundreds of web sites and thousands of online documents regarding energy efficiency and renewable energy. Also included are direct links to the Department of Energy offices and programs.

C. PUBLIC UTILITIES COMMISSION

www.puc.state.tx.us/electric/projects/25309/25309.cfm

This link provides a source of information for the Energy Efficiency Grant Program. This includes the Program Application and Guidelines as well as a list of eligible counties and utilities.

D. REBUILD AMERICA

www.rebuild.org

Rebuild America is a program under the Office of Energy Efficiency and Renewable Energy that focuses on energy efficiency solutions as community solutions. The site provides community partnerships ideas, tools, resources, and energy-smart technologies for help in fulfilling locally designed efficient energy solutions. Categories included are building renovation, new construction, renewable technologies, green building, city lighting, alternatively fueled vehicles, downtown revitalization, and more.

E. STATE ENERGY CONSERVATION OFFICE

<http://www.seco.cpa.state.tx.us>

The Texas State Energy Conservation Office provides information about various programs that are offered and how they may be implemented. SECO's programs focus on energy cost and consumption at the institutional, industrial, transportation, and residential levels.

F. TEXAS GENERAL LAND OFFICE

www.glo.state.tx.us

The primary mission of the General Land Office (GLO) is the management of state lands and mineral right properties. GLO manages an oil and natural gas program and a state electric power program. These programs provide gas and electricity to state agencies and public school districts at a discounted cost. The proceeds from the programs help to fund the state's Permanent School Fund.

APPENDIX F: SERVICE AGREEMENT



Local Governments and Municipalities

Preliminary Energy Assessment Service Agreement

Investing in our communities through improved energy efficiency in public buildings is a win-win opportunity for our communities and the state. Energy-efficient buildings reduce energy costs, increase available capital, spur economic growth, and improve working and living environments. The Preliminary Energy Assessment Service provides a viable strategy to achieve these goals.

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with the City of Rockwall, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

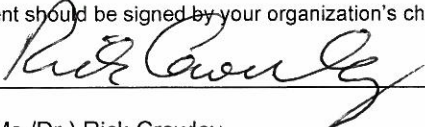
Principles of the Agreement

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- ✓ Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- ✓ SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- ✓ Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

Acceptance of Agreement

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: 

Date: 7/22/10

Name (Mr./Ms./Dr.): Rick Crowley

Title: Assistant City Manager

Organization: City of Rockwall

Phone: 972-772-6402

Street Address: 385 S. Goliad

Fax: 972-771-7727

Mailing Address: 385 S. Goliad

E-Mail: rcrowley@rockwall.com

County: Rockwall

Contact Information:

Name (Mr./Ms./Dr.): Russell McDowell

Title: Conservation Coordinator

Phone: 972-772-7748

Fax: 972-771-7748

E-Mail: rmcdowell@rockwall.com

County: Rockwall

Please sign and mail or fax to: Stephen Ross, **Local Governments and Municipalities** Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-463-1770. Fax 512-475-2569.